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ABSTRACT

Children aged 2-1/2 to 3-1/2 years in three preschool programs were given a test battery consisting of classification, relations, and conservation tasks. One program (Ausubelian) was formal and two programs (Piagetian and Tradition) were informal. Posttest data for the first year of a three-year longitudinal study indicated significantly superior performance for the Ausubelian Program children on dichotomous sorting, spontaneous classification, class inclusion, serial ordering, additive seriation, and serial correspondence. There was little difference in performance between the Piagetian and Traditional Program groups. (Author/JMB)

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EFFECTS OF FORMAL AND INFORMAL PRESCHOOL PROGRAMS ON LOGICAL CONCEPT LEARNING AND DEVELOPMENT: AN INTERIM REPORT

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EFFECTS OF FORMAL AND INFORMAL PRESCHOOL PROGRAMS ON LOGICAL CONCEPT LEARNING AND DEVELOPMENT: AN INTERIM REPORT

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Introduction

A longitudinal study of young children's learning and development of logical concepts was begun in 1977 to continue until 1980. Children entering the project at about age 3 years will have completed two years of preschool and one year of kindergarten by June 1980. In this paper we shall report the results from the first year, 1977-1978.

The first year study has two aims. The first is to compare the effects on logical concept learning of verbal-rule training in a formal preschool program to indirect methods of teaching in two types of informal program. The second is to examine the effects of verbal-rule training on near-near, near-far, and far-far transfer (e.g., Brainerd, 1974).

General Characteristics of Preschool Programs

Traditionally preschool programs, other than the Montessori types, have been informal in organization. Usually, the degree of formality or informality of a program is described in terms of the proportion of teacher versus child directed activities. Informal programs will have a majority of child directed learning activities. It is accepted this definition is overly simplistic but has been treated in greater detail elsewhere (Lawton et al., 1979). The case for formal learning experiences

is generally made in relation to the disadvantaged child (e.g., Bereiter & Engelmann, 1966; Weikert, 1973). For those children who are expected to receive sufficient instruction in the home, it has been argued that the preschool can provide needed "enrichment" kinds of experiences that are expected to facilitate normal development of physical, social, and logico-mathematical knowledge (e.g., Elkind, 1976; Furth, 1969; Kamii & DeVries, 1977). Other psychologists and educators consider that a formal approach is perhaps crucial during the early years (e.g., Bloom, 1964; Hunt, 1961; Smedslund, 1961).

Those specialists who argue for an informal, enrichment type of preschool program, and who espouse a Piagetian view of intellectual development, almost invariably expect children at the preschool-level will be predominantly preoperational in their thinking. Those who argue for a formal approach are concerned about the precursors of later cognitive development. Either they believe it is necessary to ensure children acquire certain competencies by teaching them, or they believe advanced competencies (beyond the preoperational level) can be found in preschoolers--"if only we look" (Gelman, 1979; Case, 1978).

Recertly, Gelman (1979) has commented that preschool children have been characterized as lacking competency in concrete operational reasoning. She goes on to summarize a considerable amount of evidence, that has accrued over recent years which strongly suggests that, under certain conditions, or following certain types of training procedure, preschool children are not so cognitively inept as previous descriptions would have us believe (e.g., Keil, 1977; Lempers, Flavell, & Flavell,

1977; Gelman, 1972; Gelman & Gallistel, 1978; Gelman & Shatz, 1977; Markman & Siebert, 1976).

Case (e.g., 1978) theorizes that young children often use strategies to solve Piagetian type tasks which are not so much incorrect as incomplete. He suggests that children's competencies might be improved by (a) using instruction which demonstrates a useable strategy that the child can exchange for the "everyday strategy" that usually doesn't work; and (b) reduce memory requirements for learning to a minimum.

Rule instruction for teaching Piagetian logical concepts has certainly proved successful (e.g., Beilin, 1971; Gelman, 1969; Lawton & Wanska, 1979).

Verbal-Rule Training and Transfer

It should be made clear from the outset that verbal-rule training is expected to have a positive influence on the learning and development of logical concepts. In this project, such training was available only in the formal program. Piaget (Inhelder & Piaget, 1958) maintains that the learning of logical concepts can only be considered meaningful to the extent that it is durable in memory and is transferable, not only to like operations but to all operations that make up the structure of a particular stage. Thus, for training in, say, class inclusion to be meaningful, the learning of this operation should transfer to both relations and conservation. Research evidence suggests this is not the case. Brainerd (1974) describes three forms of transfer: near-near (e.g., training on class-inclusion will transfer to similar class-inclusion problems), near-far (e.g., training on class-inclusion will transfer to, say, cross-classification),

and far-far (e.g., training on class-inclusion will transfer to, say, relations and conservation). In practice, the direction of transfer is complex and appears to depend on a variety of factors. Although it is oversimplifying the issue, in general very young children seem to find near-near transfer easiest to achieve, followed by near-far. It is rarely the case that far-far transfer occurs.

Three Preschool Programs

In this study, the effects of three types of preschool programs on young children's concept learning and development were compared. One program is based on Ausubel's learning theory (e.g., Ausubel, Novak, & Hanesian, 1979). A second program is based on Piaget's theory of development, and a third program is based on a "play" orientation to learning. The first program can be considered formal in structure and operation, the second more informal than the first, and the third, the most informal of the three programs. By necessity, descriptions of these three programs which follow must be short.

The Ausubelian Program

In the Ausubelian program a particular sequence of learning is arranged. During small group instruction, both general subject-matter concepts and high-order rules for performing logical operations are demonstrated. In both cases, children are encouraged to learn the intensional properties of the general concepts and rules. Although teaching is expository, children are actively engaged in manipulating concrete learning materials (e.g., objects, picture-cards, etc.).

Children may be learning, for example, rules for identifying crucial properties of objects, rules for classifying objects (to include identifying crucial properties) or rules for conservation (which again would include rules for identifying crucial properties). Following small group instruction, children move to related learning activities. These activities serve two purposes. First, extensional properties of general concepts and rules are presented. And second, children are prompted to apply the general concepts and rules learned during small-group instruction to the solving of related problems.

The Piagetian Program

The emphasis in classroom organization in the Piagetian program is on stimulating cognitive growth while ensuring a growth of knowledge through actions. An overemphasis on representation is deprecated, as it may hinder the "spontaneous" development of the child. Encouraging spontaneity of action and its necessary relation to the internal structuring of knowledge in terms of intellectual operations (e.g., preoperational or concrete operational thought) is an important continuing objective of the teachers.

This "spontaneity" of activity is emphasized because of the expected relatively long time span during which certain reasoning powers are believed to develop, which precludes specifying elaborate curriculum sequences based on orders of acquisition logical to adults. The analysis of sequence in the acquisition of "knowledge" (synonymous with intelligence) should be attempted from the child's point of view. The expectations of the child's capacities, however, are based on the (theoretically) invariant

sequence of stages of intellectual growth. Thus "stage" as determined by Piaget's theory is used to predict an expected upper and lower level of functioning of the preschool child. This functioning is set within the context of preoperational thinking characterized by centration and egocentricism. If the child happens to be in a period of transition, between stages, responses are expected to be highly erratic. Nevertheless a certain synchrony in development of operations within a given stage can be expected.

These suppositions inevitably demand that the teacher interacts extensively with both child and learning materials trying constantly to prompt the child to initiate his own activities.

Learning experiences begin in small groups, which emphasize some particular function such as classifying or seriating. The children are encouraged to attend to such functions in their interactions with objects, but not directly taught. During subsequent related activities children are free to move from one activity center to another, in each case determining how they will interact with materials. Intervention by the teacher at this time is in keeping with the general principles governing teacher-role.

The Traditional Program

In many respects, the traditional program is similar to the Piagetian Program. However, teachers in this program do not base their functions on any particular learning or developmental theory. Compared to the Piagetian program, children are freer to indulge their interests most of the time. If teachers join in these activities, it is at the

child's level of operation. No attempt is made to "move" the child's perspective or change direction of thinking.

All three programs include activities usually found in preschools such as socio-dramatic play, large and small motor activities, large group activities, free play, snack-time, art, music, etc.

Hypotheses

It was expected that: (1) the order of effect of the three preschool programs on children's learning of logical concepts would be Ausubelian (A) > Piagetian (P) > Traditional (T); (2) children in the A program would achieve transfer of training on tasks related to the general rules taught during the first 16 weeks--that is, class-inclusion and relations (near-near transfer); (3) children in the A program would not achieve near-far transfer to multiple-classification and relations (as demonstrated in matrices tasks) nor far-far transfer to conservation problems. These expectations are based, in part, on a previous longitudinal study (Lawton et al., 1979).

Based on the results of previous research (e.g., Kofsky, 1966) it was also expected there would be an order of task-difficulty.

Method

Sample

Children entering three preschool programs in the fall of 1977 were aged about 3 years (range 2 years 7 months to 3 years 9 months). There

were 20 children in each of three programs. Children were of mixed ethnic origins. Children in the three programs at entry were comparable by age and performance on the Peabody Picture Vocabulary Test (PPVT). These three groups were considered contrast groups.

Procedure

Before each program began, children were individually tested on a battery of Piagetian tasks which included classification, relations, and conservation tasks. They then followed their respective programs for a period of six team weeks. It is important to point out that, during these first six team weeks, children in the Ausubelian program were taught general rules for dealing with class-inclusion and relations only. Further training for multiple classification and relations and conservation was scheduled for subsequent years. No details of verbal-rule training, or teaching procedures is given here. More detailed information will be provided in subsequent reports.

Posttests were given at the conclusion of the 16-week period.

Results

Means and standard deviations for pre- and post-tests are presented in Table 1 (attached). A MANOVA indicated significant between group differences following training. The post-hoc analysis is reported in Table 2 (attached) in the form of t-test results.

Conclusions

The results from the first year of the longitudinal study can be briefly summarized. Data indicates a superior performance for A program

children on dichotomous sorting, spontaneous classification, class inclusion, serial ordering, additive seriation, and serial correspondence. These results more strongly favored the A Program than was the case in the first longitudinal study (Lawton et al., 1979). There was little evidence to support the prediction of a superior performance for the P Program children compared to the children in the T Program. In general, results from these two groups were about the same. Where differences occured these usually favored the T Program. These results differed from those obtained in the first longitudinal study (Lawton et al., 1979) where the P Program group were generally superior to children in the T Program.

Although positive near-near transfer occured in the case of children in the A program on a broad range of classification and relations tasks, these children did not achieve near-far or far-far transfer.

Evidence from protocols related to multiple classification and relations tasks, and those related to conservation tasks supports Case's belief that children often come to a task with a reasonable strategy that is oversimplified.

It is apparent from the data in Table 1 that certain tasks were found easier than others by children in general.

Children returning to the programs in the fall of 1978 were immediately tested on the battery of tasks used for the first year. The results have not yet been fully analyzed. What we have in hand shows that A program children appear to maintain the improved performance achieved during the first year. No changes in performance seem to be indicated for children in the two informal programs.

A final report will be written during 1980 and should be available in the late Fall of that year, or early in 1981. Interested readers may obtain copies from the first author of this report. (Address: Child and Family Studies Program, School of Family Resources and Consumer Sciences, University of Wisconsin, 1300 Linden Drive, Madison, Wisconsin, 53706.)

Table 1

Means and Standard Deviations

Group	N	DS(3)[a]	MS(3)	CI(5)	CC(2)	MR(2)	SO(9)	AS(5)	SC(8)	CLS(6)	CN(6)	CL(6)	CA(6)	CW(6)
							PRETEST							
A		0.4(0.5)[b]	0.4(0.6)	1.0(0.9)	0.0(0.0)	0.1(0.2)	4.0(2.1)	1.5(1.7)	3.1(3.3)	0.4(0.6)	0.4(0.5)	0.5(1.5)	0.7(1.6)	0.2(0.7)
P		0.4(0.3)	0.6(0.7)	0.9(1.2)	0.1(0.3)	0.1(0.2)	4.8(1.9)	0.8(1.5)	2.2(2.3)	0.1(0.1)	0.2(0.4)	0.2(1.1)	0.2(1.2)	0.1(0.3)
T		0.7(0.7)	0.7(0.7)	1.6(1.5)	0.1(0.3)	0.1(0.3)	4.3(2.0)	1.8(2.7)	3.9(2.9)	0.3(0.8)	0.3(0.8)	0.3(1.0)	0.7(1.7)	0.3(0.8)
							POSTTEST							
A		1.4(0.7)	1.5(0.5)	2.4(1.8)	0.2(0.2)	0.1(0.3)	6.5(1.8)	3.4(2.1)	6.3(3.1)	0.3(1.2)	0.5(1.5)	0.7(1.7)	0.5(1.5)	0.1(0.2)
P		1.0(0.7)	0.5(0.8)	0.4(1.3)	0.1(0.4)	0.1(0.1)	4.8(2.3)	2.1(2.2)	4.2(3.6)	0.4(0.8)	0.7(0.5)	0.2(0.8)	0.4(0.7)	0.3(0.5)
T		1.1(0.7)	1.1(0.7)	0.8(1.3)	0.2(0.4)	0.2(0.4)	5.5(2.3)	1.9(2.0)	4.1(3.4)	0.0(0.0)	0.3(1.2)	0.0(0.0)	0.1(0.4)	0.0(0.0)

DS Dichotomous Sort; MS Multiple Sort; CI Class Inclusion; CC Cross-Classification; MR Multiple Relations; SO Serial Ordering; AS Additive Seriation; SC Serial Correspondence; CLS Conservation of Liquid Substance; CL Conservation of Length; CA Conservation of Area; CW Conservation of Weight.

a = Score range
b = Standard deviations in parentheses

Table 2

Between Group T-Test Results for Posttests

Test	AvP[a]	AvT	TvP
DS	.003		.05
MS	.01	.05	.05
CI	.0001	.001	
SO	.003		.05
AS	.05	.05	
SC	.05	.05	

[a]Difference favors first group in each comparison. No significance between group differences were found for conservation tasks.

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